

Remarks:

Claims 1, 2, 4, 7-11, 13-20, 24-29, 32-34, and 37 – 39 were pending.

Claims 14-20, 24-29, 32-34, 37, and 38 are withdrawn.

Response to the Examiner's "Response to Augments"

1) The Examiner argues that Gotcher reference teaches that ETFE and PVDF are functional equivalents. The Gotcher reference does teach that both ETFE and vinylidene fluoride polymers are fluorocarbon polymers (Col. 2, lines 63-68), and can undergo the crosslinking reaction as taught by Gotcher. However, there are two huge difference between the Gotcher process and Applicant's claimed process:

a) The Gotcher process leads to crosslinking. Applicant's process leads to grafting. Applicant's claimed grafting compound contains a "single C=C double bond", while the Gotcher crosslinking agent contains a "molar percentage of carbon-carbon unsaturated groups of greater than 15... (such as) triallyl cyanate, triallyl isocyanate, triallyl trimesate, tetraallyl pyromellitate" (Col. 3, lines 24-30). Applicant specifically describes the problems with possible crosslinking: "The presence of more than one double bond in the graftable compound may cause crosslinking of the fluoropolymer, and therefore a modification in the rheology properties, or even the presence of gels, which are undesirable... Thus, graftable compounds containing only a single C=C double bond are preferred". (page 10, lines 14-22) The multi-unsaturation of Gotcher leading to crosslinking is a very different teaching than Applicant's grafting using a compound having only one double C=C bond.

b) The Gotcher process with ETFE or PVDF and an added compound that is irradiated, occurs in a very different order. The Gotcher process order is to add the crosslinking compound after fabrication, followed by irradiation. (Col. 1, lines 58-61). Applicant's claimed process involves adding the graftable metal salt(step a) before forming into films, sheets... (step b), then followed by irradiation (step c). So while

Gotcher teaches that ETFE and PVDF are both fluoropolymers, it does not teach the same process with the same reactants and in the same order as in Applicant's claims.

2) The Examiner states that "Mimura provides evidence that ETFE and PVDF are suitable in crosslinking by using irradiation". (page 7). As stated above, Applicant's process specifically is NOT crosslinking, but rather a grafting reaction using a graftable metal salt containing a single C=C double bond.

Rejections under 35 U.S.C. § 103

Claims 1, 2, 4, 7-11 and 13 stand rejected under 35 U.S.C. § 103(a) as obvious over WO 90/15828 (Dahl) in view of U.S. Patent No. 1,936,994 (Rice), and Gotcher. Applicants respectfully traverse these rejections for the reasons presented herein.

Dahl

The Dahl reference teaches the grafting of ETFE with ethyl acrylate. However Dahl fails to teach or suggest PVDF polymers or graftable metal salt stabilizers. In Example 4 (page 16) a phenolic inhibitor is added prior to irradiation grafting.

- a) ETFE of Dahl, having $\text{CF}_2=\text{CF}_2$ monomer units and $\text{CH}_2=\text{CH}_2$ monomer units is different from Applicant's PVDF having $\text{CF}_2=\text{CH}_2$ monomer units. Since PVDF monomer units are more symmetrical, a semi-crystalline polymer results – having properties and reactive potential different from ETFE. While these are both thermoplastic fluoropolymers, the crystallinity differences produce difference in performance properties, as well as chemical properties.
- b) The Dahl reference Example 4 includes a phenolic inhibitor, similar to the optional antioxidant stabilizer of Applicant's claims. There is no teaching or suggestion in Dahl of Applicant's required graftable metal salt for the purpose of stabilization. Nor does the Dahl reference teach or suggest the need for a stabilizer that is chemically

attached to the polymer backbone, but suggests only stabilizers that have no attachment to the fluoropolymer polymer backbone.

Rice

The Rice reference teaches adding sodium undecylenate (as a stabilizer) to a rubber latex prior to vulcanization.

The Rice “rubber” is never taught or suggested to be a fluoropolymer. Moreover, a “rubber” is not a thermoplastic (as in Dahl or the present invention). So the Rice “rubber” teaches away from both Dahl and Applicant’s claims.

The Rice stabilizer is added to a creamed latex (aqueous dispersion). The Dahl reference and Applicant’s process involve blending in a melt – so Rice teaches away from Applicant’s claims, and cannot be combined with the Dahl different technology.

Further, Rice teaches a vulcanization (crosslinking) process. This teaches away from Applicant’s grafting process.

The Rice mention of sodium undecylate as an emulsion stabilizer having known surfactant properties of a hydrophilic end and a long hydrophobic chain. The surfactant is may for physical interactions with the rubber latex particle, but it is not taught or suggested as being grafted onto the polymer backbone, and irradiation is not taught or suggested.

Accordingly, Rice fails to remedy the deficiencies of Dahl.

Murphy?

The Examiner’s reference to “Murphy” in the last line of page 3 of the present office action is not understood?

Gotcher

The Gotcher reference is described in the comments above. The Gotcher reference teaches a crosslinking reaction that occurs by adding a crosslinking agent after a fluoropolymer article is formed, then followed by irradiation. Applicant claims a process that involves grafting, not cross-linking, and Applicant's graftable metal salt is added before forming the blend into an article, powder or granule.

The Gotcher reference fails to heal the deficiencies of Dahl or Rice, to teach or suggest all of Applicant's claim limitations.

Dahl, Rice, Gotcher, Kotliar

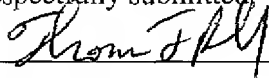
Claim 39 stands rejected under 35 U.S.C. § 103(a) as obvious over WO 90/15828 (Dahl) in view of U.S. Patent No. 1,936,994 (Rice), and Gotcher (US 4353961) and further in view of Kotliar (US 4,886,689). Applicants respectfully traverse these rejections for the reasons presented herein.

The Dahl, Rice, and Gotcher references are discussed above, and together fail to teach or suggest all of Applicant's claim limitations. The Kotliar reference is cited as a secondary reference to teach that additives can be grafted onto a fluoropolymer-polyolefin. The additives in Kotliar are "long chain aliphatic groups having end groups reactive toward the halogen carbon bond of the fluoropolymer", Col. 8, lines 51-56. "reactive groups" is illustrated by amines, thiols, or phols – Col. 8, lines 55 and 56. The reactive groups of Kotliar are not those claimed by Applicant as graftable metal salts, nor are they the compound containing a single C=C bond and a polar group. There is also no teaching or suggestion in Kotliar of irradiation grafting of both a compound having a C=C double bond and a functional group, plus a graftable metal salt.

Conclusion:

Kotliar, Dahl, Rice, and Gotcher, together fail to teach or suggest the existence of two different grafting moieties. Applicant claims a process for grafting both a compound having a C=C double bond and a functional group, plus a graftable metal salt as a stabilizer. For all of the foregoing reasons, Applicants respectfully request reconsideration and allowance of the claims. Applicants invite the examiner to contact their undersigned representative if it appears that this may expedite examination.

Respectfully submitted,



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